Polymers

Unit 3 · Materials · matches the "Polymers" lesson slides (about 60 minutes)

Teacher notes for someone teaching this lesson without a Design and Technology background, including a cover or supply teacher standing in for the usual class teacher.

IF YOU ONLY DO ONE THING (RUSHED COVER LESSON)

If you only do one thing: make sure every pupil can say what "Thermoplastic" means in their own words before the lesson ends. A polymer that can soften when heated and be reshaped. Ask two or three pupils to explain it back to you - do not just ask "does that make sense?".

Key facts in plain language

These are the facts this lesson depends on. They are written in plain English, not subject jargon, so you can say them in your own words while you teach.

Thermoplastic:
A polymer that can soften when heated and be reshaped.

Thermoset:
A polymer that cures into a cross-linked structure and cannot simply be remelted.

Elastomer:
A polymer that can stretch substantially and recover its shape.

PLA:
A thermoplastic commonly made from renewable feedstocks; industrial composting conditions may be required for suitable grades.

Common misconceptions

Drawn from the wrong answers pupils pick in this lesson's own question bank, paired with the explanation that is already written for the right answer.

Pupils may think: "Melamine formaldehyde" is correct.
Why it is wrong: the correct answer is "Acrylic (PMMA)". Acrylic softens with heat and can be formed.

Pupils may think: "They conduct electricity safely to earth" is correct.
Why it is wrong: the correct answer is "They insulate well and do not soften when warm". Thermosets can provide electrical insulation and heat resistance.

Pupils may think: "Iron ore and limestone" is correct.
Why it is wrong: the correct answer is "Crude oil or natural gas". Many conventional polymers use petrochemical feedstocks.

Pupils may think: "Line bending" is correct.
Why it is wrong: the correct answer is "Vacuum forming". Vacuum forming pulls softened sheet over or into a former.

Pupils may think: "It is a thermoset, so it cannot be remelted or printed" is correct.
Why it is wrong: the correct answer is "It is often bio-based but may need industrial composting". PLA is often bio-based, but end-of-life claims depend on grade and disposal conditions.

Talking points to follow the slide deck

The slide deck for this lesson follows the usual DT Classroom shape: a retrieval starter, then each key term below in turn, worked examples, exam-style practice, then an exit ticket. Use these lines as you reach each part - they are the same facts as above, just phrased as something you can say out loud.

When the deck reaches "Thermoplastic": say — A polymer that can soften when heated and be reshaped. Ask: "can someone give me an example?"

When the deck reaches "Thermoset": say — A polymer that cures into a cross-linked structure and cannot simply be remelted. Ask: "can someone give me an example?"

When the deck reaches "Elastomer": say — A polymer that can stretch substantially and recover its shape. Ask: "can someone give me an example?"

When the deck reaches "PLA": say — A thermoplastic commonly made from renewable feedstocks; industrial composting conditions may be required for suitable grades. Ask: "can someone give me an example?"

Worked answers to this lesson's questions

The same question bank used for this lesson's knowledge organiser self-check and worksheet exam practice. Use this page as the answer key, or cover the right-hand explanation and hand out the questions as a silent task (see the cover lesson box below).

1. Which is a thermoplastic?

a) Melamine formaldehyde, b) Acrylic (PMMA), c) Urea formaldehyde, d) Epoxy resin

Answer: b) Acrylic (PMMA). Acrylic softens with heat and can be formed.

2. Why are some electrical fittings made from thermosetting polymers?

a) They conduct electricity safely to earth, b) They can be remelted and reshaped if they are damaged, c) They are flexible, so they absorb knocks, d) They insulate well and do not soften when warm

Answer: d) They insulate well and do not soften when warm. Thermosets can provide electrical insulation and heat resistance.

3. Most conventional plastics are made from feedstocks derived from…

a) Crude oil or natural gas, b) Iron ore and limestone, c) Silica sand and soda ash, d) Natural cotton and wool fibres

Answer: a) Crude oil or natural gas. Many conventional polymers use petrochemical feedstocks.

4. Which process can form heated thermoplastic sheet over a former?

a) Line bending, b) Vacuum forming, c) Injection moulding, d) Extrusion

Answer: b) Vacuum forming. Vacuum forming pulls softened sheet over or into a former.

5. Which statement about PLA is safest?

a) It is a thermoset, so it cannot be remelted or printed, b) It always biodegrades quickly in the sea, c) It is made from crude oil, like PVC, d) It is often bio-based but may need industrial composting

Answer: d) It is often bio-based but may need industrial composting. PLA is often bio-based, but end-of-life claims depend on grade and disposal conditions.

READY-TO-RUN COVER LESSON

Project the existing lesson slides as normal; read the key facts and talking points above before the lesson starts.

Low-prep silent task (needs no workshop tools or machinery): write or display the numbered questions above without the "Answer:" line, and have pupils answer them in silence on paper. Mark from the answers above at the end, or next lesson.

If the lesson plan calls for tools, machinery, heat or anything hands-on, do not run that part as a non-specialist cover teacher - set the silent task above instead and leave the practical for the subject teacher. See the general workshop safety guide in the Teachers hub.